## Design Requirements

Power source: 48V DC

**External parallel FET shunt dimming**

fSW = 500000 # Hz Switching frequency (at nominal VIN, VO)

VIN = 48 # V Nominal input voltage:

VIN\_MAX = 75 # V Maximum input voltage

VO = 36 # V Nominal output voltage (number of LEDs x forward voltage)

rD = 0.02 # Ohm LED string dynamic resistance

ILED = 1 # A Average LED current

ΔiLED\_PP = ΔiL\_PP = 1 # A LED current ripple, Inductor current ripple

ΔvIN\_PP = 2.0 # V Input voltage ripple

VTURN\_ON = 34 # V UVLO characteristics

VHYS = 2.0 # V UVLO characteristics

η = 0.95 # Expected efficiency

ROFF = 24.51500507367445 kΩ, use 1% tol

Closest 1% ROFF1 = 24.3 kΩ

tOFF = 417.35985436754584 ns

fSW = 504.42397270935083 kHz

Inductor Ripple Current

L = 15.024954757231649 μH

Closest standard value is 15.0 μH

actual ΔiL-PP is 1.00166365048211 A

Average LED Current

IL\_MAX 1.5008318252410549 A

RSNS 0.1652416985228626 Ω

Closest 1% RSNS1 = 0.165 Ω

actual ILED is 1.002198477789248 A

tON = 1565.0994538782982 ns

CIN ≥ 1.5685402902656138 μF

IIN\_RMS = 408.5787383233875 mA

PFET

IT = 791.209324570459 mA

IT\_RMS = 1043.0784380578393 mA

PT = 206.72239930882452 mW

Diode

ID = 210.98915321878906 mA

PD = 158.2418649140918 mW

Dimming FET

ROFF2 = 638.0708995099881 kΩ

Closest 1% ROFF2 = 649.0 kΩ

UVLO

RUV2 = 90.9090909090909 kΩ

Closest 1% RUV2 = 91.0 kΩ

So VHYS = 2.002 V

RUV1 = 3.4444444444444446 kΩ

Closest 1% RUV1 = 3.48 kΩ

So VTURN\_ON = 33.66528735632184 V

## Parts List

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| QTY | PART ID | PART VALUE | PART NUMBER | PACKAGE |
| 1 | LM3409HV | DC DC Controller Step-Down (Buck) | LM3424MH | 10-MSOP-PowerPad |
| 1 | RUV1 | 3.48 kΩ 1% 1/8W | ERA-6AEB3481V | 0805 |
| 1 | RUV2 | 91.0 kΩ 1% 1/8W | ERJ-6ENF9102V | 0805 |
| 1 | ROFF1 | 24.3 kΩ 1% 1/8W | ERJ-6ENF2432V | 0805 |
| 1 | ROFF2 | 649 kΩ 1% 1/8W | ERJ-6ENF6493V | 0805 |
| 1 | COFF1 | 470 pF X7R 10% 100 V | GRM155R72A471KA01D | 0402 |
| 2 | DOFF1 | 50V 1A, Vf=1.1V | S1ATR | DO-214AC, SMA |
| 1 | L1 | 15 μH 20% 5A | SRR1260-150M | Nonstandard |
| 1 | CF1 | 1 μF X7R 10% 16 V | CGA3E1X7R1C105K080AC | 0603 (1608 Metric) |
| 1 | CIN | 2.2 μF X7R 10% 70 V | GRM32ER72A225KA35L | 1210 (3225 Metric) |
| 2 | RSNS1 (alt) | 0.330 Ω 1% 1/2W | ERJ-8BQFR33V | 1206 |
| 1 | RSNS1 | 0.165 Ω 1% 1/4W | PT1206FR-070R165L | 1206 |
| 1 | D1 | SCHOTTKY 100V 3A | S310FA | SOD-123FA |
| 1 | LED | LED COB WHT 5600K 95CRI, 36V 1A | CVM-14-56-95-36-AC00-F2-2 | 19.00mm L x 19.00mm W |
| 1 | Q1 | P-CH 60V 7.2A DPAK  70 mΩ, Qg 30 nC | DMPH6050SK3-13 | TO-252-3, DPak (2 Leads + Tab) |
| 1 | Q2 | N-CH 70V 6.1A D-PAK  130 mΩ | ZXMN7A11KTC | TO-252-3, DPak (2 Leads + Tab) |
| 1 | Power Jack | Rated 48VDC, 6.5A | 54-00063 | 2.10mm ID (0.083"), 5.50mm OD (0.217") Panel Mount |